pendicial abscess. The man died on the fifth day, and at autopsy a large enterolith, having a nucleus of hair, was found embedded in a fistulous communication between the appendix and the right ureter, at the brim of the pelvis.

THE SKIN REACTION AFTER COWPOX VACCINATION. A POSSIBLE AID IN PUBLIC HEALTH ADMINISTRATION.*

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During the course of an anti-vaccination meeting held in Berkeley recently, the principal speaker of the evening issued a challenge for any person present to define successful vaccination.

The anti-vaccinationist, firm in the conviction that the medical profession still holds unchanged the hypothesis of Jenner, must of necessity find many weak points in the definition laid down in the present vaccination act.[1]

For obvious reasons no one in the audience had the temerity to take up the gauntlet thrown down by this knight of medical freedom, and his further statement that vaccination does not guarantee protection from smallpox found no dissenters.

This paper in an attempt to frame a definition of successful vaccination which, while probably not meeting the requirements of the challenger, will at least take cognizance of certain facts not usually recognized from a public health administrative standpoint.

In Jenner's original monograph (1798) the statement is made that the attempt to inoculate with variolous matter a person who had previously had cowpox, would result in a speedy efflorescence around the site of inoculation, which would fade away in a few days without further symptoms.

"It is remarkable," writes Jenner, "that variolous matter, when the system is disposed to reject it, should excite inflammation on the part to which it is applied more speedily than when it produces smallpox. Indeed, it becomes almost a criterion by which we can determine whether the infection will be received or not. It seems as if a change which endures through life had been produced in the action or disposition to action in the vessels of the skin; and it is remarkable too, that whether this change has been effected by the smallpox or the cowpox that the disposition to sudden cuticular inflammation is the same on the application of variolous matter."

Von Pirquet gave to Jenner's "sudden cuticular inflammation" the name "immediate reaction." He showed that inoculation of a previously sensitized individual with the organism producing vaccinia, would give rise to one of several related phenomena.

1. If specific antibodies were present in the blood of the individual, the vaccine matter would be promptly digested. Clinically this "immediate reaction" is manifested by a small areola of "efflorescence" with perhaps a papule which disappears by the end of 48 hours.

2. If specific antibodies are not present but the power of forming them still persists, the vaccinia organisms may begin to grow. This growth is checked as soon as the antibodies are sufficiently developed. Clinically we see a scale of appearances ranging from "early reaction" and "torpid early reaction" through many types of "accelerated reaction" or vaccinoid, depending on the length of time between the inoculation and the appearance of the antibodies.

The varying clinical pictures ranging from "immediate reaction" to true vaccinia must all, therefor, be regarded as successful vaccinations, since they are witnesses of the formation of antibodies and the consequent restoration of immunity. Figuratively speaking, the further the clock has run down the longer it takes to wind it up.

The following illustrative cases are taken from a series of eighty individuals examined with reference to the "sudden cuticular inflammation" of Jenner, or the skin reactions of Von Pirquet. These were chosen haphazard from over twelve hundred persons vaccinated during the months of January and February, 1913, at the University of California Infirmary.

1. W. P.—Had smallpox four years ago and is pitted on forehead, cheeks and nose. At the end of 24 hours had a very faint areola around the vaccinated point. At the end of 48 hours this had grown to a bright red areola measuring 15 mm. surmounted by a small papule. At the end of 72 hours there were signs of beginning papilla formation, and a final observation at the end of five days resulted in a diagnosis of vaccinoid.

2. J. B. P.—Had smallpox four years ago and is very deeply pitted, especially on the nose. At end of five days, when the normal vaccinia is just beginning to show papule formation, this case had developed a vaccinoid.

These two cases are examples of the "accelerated reaction."

3. H. F.—Vaccinated in 1905 and at present has a 10 mm. scar which has *no pits*. In 1907 had smallpox, and it well pitted on nose and forehead. Twenty-four hours after revaccination showed a 4 mm. areola around the point of insertion. At the end of 48 hours this had grown smaller, and at the end of five days had disappeared.

4. H. R. M.—Vaccinated between 16 and 20 years ago, and has a poorly marked scar, measuring less than 15 mm. Twenty-four hours after revaccination there was no areola around the point of vaccination. At the end of 48 hours areola of 5 mm. and a small papule. At end of five days a vaccinoid. Revaccinated some days later and showed both areola and papule at the end of 24 hours. At the end of 48 hours showed areola only, which had disappeared by the time of the fifth day observation.

These two cases are examples of the "immediate reaction" which in the case of H. R. M. followed an accelerated reaction.

* Read at the Forty-third Annual Meeting of the State Society, Oakland, April 1913.

1 Successful vaccination means that there has been evidence of a normal vaccinia, and that the person so vaccinated may be assured of immunity to smallpox for at least five years without repetition of the vaccination. Vaccination Act of March 7, 1911.

5. R. P.—Vaccinated over twenty years ago and has a small, well-pitted scar. During the course of some observations on the potency of vaccine virus, was revaccinated with three different strains of virus, the first two resulting in failures and the third in a vaccinoid. Before the vaccinoid reaction had reached its height she was revaccinated a fourth time in two spots with a control. At the end of 24 hours there was no areola. At the end of 48 hours there was no areola, and at the end of five days there had been no change in the spots, though the vaccinoid had meantime run its course.

This case shows that there is a time element in antibody formation. The third vaccination was destined to stimulate antibody formation, but the fourth followed so quickly that there were as yet no antibodies, and in consequence there was no skin reaction to be observed.

6. I. R.—Vaccinated within the last five years and has a small, well-pitted scar. Twenty-four hours after revaccination had a very faint areola. Forty-eight hours after showed 8 mm. areola. At end of four days 10 mm. areola, with slight papule, which faded without developing into a papilla. Revaccination a few days later gave a 7 mm. areola at the end of 24 hours, reduced to 2 mm. at the end of 48 hours, and subsequent rapid fading.

This case shows "torpid early reaction" which stands on the border between the early reactions and the vaccinoids. Revaccination gave the immediate reaction.

7. C. S.—Vaccinated within the last month, has three deeply pitted scratches 8 mm. wide by 40 mm. long. Revaccinated in two spots with a control. At the end of 24 hours showed 3 mm. areola around the control point, and 10 mm. areola around the vaccinated spots. At the end of 48 hours the areola had markedly decreased and thereafter rapidly faded.

This case illustrates "immediate reaction" in an extreme degree.

8. G. S.—Vaccinated several years ago, with no reaction at the site of inoculation, but claims to have had a generalized vaccinia, which left numerous shallow circular scars, slightly pitted, measuring 10 to 15 mm., distributed mainly on forearms and legs. No areola 24 hours after revaccination. At end of four days 8 mm. areola which proceeded to develop into the papilla of a normal vaccinia.

This case illustrates the value of a ready-made diagnosis.

9. V. N.—Vaccinated over 20 years ago and has a small keloidal scar. At the end of 24 hours had 5 mm. areola which developed into a papule at the end of 48 hours and had begun to subside at the end of 72 hours.

This case illustrates "early reaction" which is slower than "immediate reaction."

10. A. W.—Vaccinated between 16 and 20 years ago, and has a small, poorly-marked scar. Revaccinated in two spots with a control. At the end of 24 hours 3 mm. areola on the control point, and 6 mm. on each of the vaccinated points. At the end of 48 hours practically the same condition. At the end of five days a 20 mm. areola which developed into a vaccinoid. Again revaccinated after some days showed 8 mm. on the vaccinated points at the end of 24 hours, 6 mm. with slight papule at the end of 48 hours and only small brown spots at end of five days.

11. Vaccinated between 11 and 15 years ago and has a large scar. Revaccinated in three spots, observed at end of a week and recorded as a failure, there being only three tiny scabs to mark the spots of insertion. Again revaccinated in three spots at end of ten days from previous revaccination. In 24 hours 6 mm. areola around all 6 spots. At end of 48 hours still had 4 mm. areola which rapidly disappeared.

This case illustrates the effect of insufficient dosage, or "sleeping germs." The combined organisms of the two doses were able to call forth the immediate reaction which the single dose was not able to do alone.

Assuming that it might be of interest to read the observations on the series of eighty cases in terms of existing scars, two tables have been prepared to accompany this paper.

The first table shows the number of individuals in the series, giving each type of reaction, and further classes the reactions according to the observed attributes of the existing scars.

The second table is a similar grouping on a percentage basis.

TABLE I.

Immunity Reactions Classed According to Attributes of Scars.

Attributes of Scars.	Vaccinia	Vaccinoid or Accelerated Reaction.	Torpid Early Reaction	Early Reaction	Immediate Reaction	Sleeping Germs	Anti-Anaphylaxis.
NO SCAR	1	4		3	2		
CHARACTER:							
pitted		4	2	5	9		1
keloidal		5		5	9		
smooth	4	7	1	3	4		1
SIZE:							
small—under 15 mm.	2	7	1	11	15		1
medium—16-25 mm.	2	6	1	4	7		
large—26-40 mm.		3	1		2	1	
very large—over 40 mm.					1		
AGE:							
under 5 yrs.	1	1	1	2	3		
6-10 yrs.	1	10		3	5		
11-15 yrs.	3	3		4	11	1	
16-20 yrs.		2	1	2	1		1
over 20 yrs.		2	1	4	7		1

TABLE II.

Immunity Reactions Classed by Percentages and According to Attributes of Scars.

Scars.	Vaccinia.	Vaccinoid.	Immunity Reactions.
GOOD pitted & keloidal	0	23	77
POOR smooth	21	37	42
SMALL under 15 mm.	6	19	75
LARGE over 15 mm.	8	33	59
RECENT under 10 yrs.	7	41	52
AVERAGE 11 to 20 yrs.	11	19	70
OLD over 20 yrs.	0	14	86

In this latter table it is interesting to note that

individuals with small, well-pitted scars furnished the highest percentage of immunity reactions, as did the individuals whose scars were over twenty years old.

Let us now consider the administrative application of Jenner's observation as explained by Von Pirquet.

In accordance with the vaccination act, a California child must be revaccinated every seven years. If the revaccination fails the child is given a "due diligence" certificate good for one year. The average physician will not issue such certificate until he has observed the failure of two or more attempts at revaccination, usually six days apart. During the recent outbreak of smallpox in Berkeley, all unvaccinated children and all children subject to revaccination were excluded from the schools. This resulted in the loss of much school time and attendance money chargeable to the "due diligence" clause of the vaccination act.

A different story would have been told if these tests of immunity had been in recognized use. Three observations following the vaccination at the end of 24, 48 and 72 hours respectively, would have given information upon which a "due diligence" certificate might have been issued with a clear conscience. It would have been necessary to repeat the vaccination only in the few doubtful cases due to "sleeping germs." If the local school department rules prescribed the number of vaccinations necessary before issuing the "due diligence" certificate, the later ones could follow the first one in rapid succession if an "immediate reaction" has given clue to the immunity of the subject; while if the first one has given a vaccinoid the later ones will give the "immediate reaction."

A better plan, however, would be to class all these evidences of immunity as successful vaccinations, for indeed the immunity conferred must be the measure of the success. This would lead to the use of a definition of successful revaccination, based on the recognition of these principles. The appended definition attempts to embody these facts in some degree.

Successful vaccination is defined as visible evidence of a normal vaccinia; provided, however, that if the person under observation has had smallpox or has had a previous vaccination, visible evidence of a modified vaccinia (sometimes known as and called vaccinoid), or evidence of any recognized reaction of immunity against vaccine, shall constitute successful vaccination.

CHRONIC DISEASE OF THE GALL-BLADDER AND APPENDIX AS ETIOLOGIC FACTORS IN THE PRODUCTION OF DIGESTIVE SYMPTOMS.*

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Normal gastro-intestinal function is disturbed to a greater or less extent by any pathologic condition within the abdominal cavity. At times this functional disturbance is noticed merely as an accompaniment of manifest local disease somewhere; at other times the disturbed physiologic function of the gastro-intestinal tract is the predominant feature to such an extent as to obscure concurrent local pathology, and the associated, and probably etiologic, local lesion is apt to be entirely overlooked. This latter class is the one particularly pertinent to the present discussion. A maximum amount of general, chiefly gastro-intestinal, symptoms; a minimum amount of local signs.

The profession as a whole has been slow in recognizing the fact that most cases of chronic indigestion, particularly those characterized by periodic acute or subacute exacerbations, have as their causative basis a chronic inflammation of either the gall-bladder or appendix or both. Valuable articles dealing with this subject have appeared from time to time in our medical literature. They seem, however, to have failed to make the general impression their worth deserves. This is evidenced by the fact that so very many of these cases receive at the hands of their attendant physician a long course of desultory treatment for indigestion without any, or at best but transient, improvement of symptoms, while the real etiologic pathology remains unrecognized, often remains unsought for, until the patient, disgusted and discouraged, seeks new advice, and finally the real cause of the trouble is discovered and remedied.

As a matter of fact the vast majority of the patients who are now being treated for chronic digestive disturbances, who have been coming to the physician's office for several months, sometimes better, sometimes worse, are suffering either from a chronic ulcer of the stomach or duodenum, or from the gastro-intestinal phenomena which represent chronic intoxication resulting from the absorption of semi-toxic inflammatory products in some organ closely associated with the gastro-intestinal canal. Nine times out of ten the focal points are the gall-bladder and appendix.

The local findings are very variable. In most instances a marked tenderness on deep pressure is more or less constantly present. At times patients are conscious of right-sided pain or discomfort. In many cases, though, the local signs are negligible and correct conclusions can be reached only by painstaking investigation and intelligent exclusion.

To differentiate between a chronic ulcer of the duodenum and a chronic cholecystitis sometimes presents difficulties. Usually, however, the symptoms of duodenal ulcer are very clear-cut: the characteristic pain; its relationship to the ingestion of food; its complete relief on again taking food; its recurrence after two or three hours; the presence of occult blood in the stools.

Many writers lay a good deal of stress on the evidence produced by attacks of gall-stone colic and the presence of jaundice as means of discrimination between cholecystitis and duodenal ulcer. I wish, in the most emphatic terms possible, to decry the value of these purely accidental symptoms. Their presence certainly points to disturbance of the gall-bladder or ducts, but their absence does not imply that the gall bladder is free from disease. Jaun-

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